In-lab resource utilization by arterial access location and procedure

Category	CATH only Radial (N=871)	CATH only Femoral (N=875)	CATH only P-Value	CATH+PCI Radial (N=335)	CATH+PCI Femoral (N=325)	CATH+PCI P-Value	PCI only Radial (N=36)	PCI only Femoral (N=42)	PCI only P-Value
Sheaths	1.1±0.4	1.2±0.5	<0.001	1.9±0.7	2.0±0.5	NS	1.2±0.6	1.1±0.4	NS
Diagnostic catheters	2.7±1.3	3.3±0.8	<0.001	2.7±1.2	3.3±0.7	<0.001	0.4±0.6	0.2±0.8	NS
Guide catheters	0.09±0.4	0.06±0.3	NS	1.3±0.9	1.3±0.7	NS	1.7±1.3	1.4±0.7	NS
Guide wires	1.5±0.7	1.4±0.8	<0.001	1.5±0.7	1.3±0.7	0.003	1.6±0.8	1.2±0.4	0.003
Interventional wires	0.08±0.3	0.05±0.2	0.033	1.7±1.2	1.6±1.3	NS	2.1±1.8	1.8±1.4	NS
Balloons	-	-		1.5±1.0	1.6±0.9	NS	1.6±1.4	1.9±1.1	NS
Stents	-	-		1.2±0.8	1.2±0.7	NS	1.5±1.2	1.7±1.2	NS
Bare metal	-	-		0.3±0.6	0.3±0.5	NS	0.4±0.8	0.5±0.8	NS
Drug eluting	-	-		0.9±0.9	1.0±0.8	NS	1.1±1.2	1.2±1.4	NS
Closure devices	0.01±0.1	0.1±0.3	<0.001	0.06±0.2	0.4±0.5	<0.001	0.03±0.2	0.4±0.5	<0.001
Hemostatic bands	0.9±0.2	0	<0.001	1.0±0.2	0	<0.001	1.0±0	0	<0.001
Contrast volume, mL	82±40	69±33	<0.001	207±88	189±76	<0.001	150±93	153±80	NS
Medications									
Heparin, n (%)	866 (99.4%)	112 (13%)	<0.001	308 (92%)	183 (56%)	<0.001	7 (19%)	16 (38%)	NS
Bivalirudin, n (%)	6 (0.7%)	4 (0.5%)	NS	96 (29%)	115 (35%)	NS	30 (83%)	26 (62%)	0.036
GPI, n (%)	62 (7.1%)	48 (5.5%)	NS	191 (57%)	205 (63%)	NS	6 (17%)	15 (36%)	NS
Time in lab, minutes	73±25	67±25	<0.001	116±33	105±31	<0.001	98±32	97±38	NS

GPI indicates glycoprotein IIb/IIIa inhibitors

Conclusion: Transition to RA as the preferred access site for CATH and PCI resulted in use of fewer catheters but more contrast and longer time in lab for RA-CATH, and RA-CATH with PCI compared to FA-CATH and FA-CATH with PCI. Resource utilization overall was similar for stand-alone RA-PCI and FA-PCI. These observations emphasize the importance of operator dependent variables in transitioning to RA, and identify opportunities to reduce resource utilization with greater RA experience.

TCT-541

Comparison of transradial and transfemoral approach for carotid artery stenting: radcar study

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Background: Transradial angiography and intervention results in fewer vascular complications, earlier ambulation, and improved patient comfort. Limited data exist for radial access in carotide artery stenting. This multicenter prospective study was performed to compare the outcome and complication rate between transradial (TR) and transfemoral (TF) PTA for for carotid artery stenting (CAS).
Methods: The clinical and angiographic data of 180 consecutive patients high risk for carotid endarterectomy treated by CAS with cerebral protection between 2009 and 2010 were evaluated in a prospective study. 111 lesions were symptomatic with carotid stenosis (>70%) and 69 lesions were asymptomatic with stenosis (>90%). Patients were categorized TR (n =60) or TF (n =120) groups and several parameters were evaluated to assess the advantages and drawbacks of TR access: procedural success, access site cross over, rate of access site complications, major adverse cardiac and cerebral events (MACCE) at 1 month and consumption of angioplasty equipment. Transradial cases were performed by two operatours skilled in transradial technique. All femoral access sites were closed with closure device.
Results: Procedural success was achieved in 179 patients (99.5%), but the cross ower rate was 8.3% and 1.6 % in the TR (1 radial artery spasm, 1 radial artery loop and 3 cannulation problems) and TF (2 iliac artery stenosis) group ($p<0.05$). Major access site complication was encountered in 3 patients (5%) in the TR group (2 asymptomatic radial artery occlusion, 1 subclavian artery perforation required transfusion and surgical repair) and in 5 patients (4.16%) in the TF group (4 femoral haematoma and 1 pseudoaneurysm) (p=ns). The incidence of MACE was 1.6% in the TR and 1.6% in the TF group (p=ns). The consumption of angioplasty equipment proved to be the same for the two groups.
Conclusion: Carotid artery stenting with cerebral protection devices can be safely and effectively performed using radial access with acceptable morbidity and high technical success.

TCT-542

Procedural Trends Associated with Successful Initiation of a Transradial Program at an Academic Training Institution

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Background: There are limited data on the safety and feasibility of initiating a transradial cardiac catheterization (TRCC) program at an academic institution where trainees are the primary operators. While TRCC reduces procedural complications and patient discomfort relative to transfemoral cardiac catheterization (TFCC), it may also be associated with longer procedural and fluoroscopy times, especially for novice operators. We describe procedural variables and clinical outcomes of TRCC in a teaching program.
Methods: Beginning in April, 2010, trainees at UC Davis Medical Center participated in TRCC, with cardiology fellows being the primary operators. Procedural variables and clinical outcomes of TFCC were compared with TRCC. To reflect the learning curve of TRCC, we also compared the first six months (n=163) of the TRCC cohort with the second six months (n=176).
Results: A total of 1,777 cardiac catheterizations were performed from April 2010-March 2011, with 339 (19%) TRCC cases. Baseline patient characteristics and procedural indices are summarized in Table 1. Overall procedural success rate was 95.6% (n=324) in the TRCC group and 99.9% (n = 1436) in the TFCC group, with low periprocedural and vascular complication rates in both groups. When the first six months of TRCC was compared to the second six months of TRCC, fluoroscopy time (18.8± 18.9 vs. 14.9± 14.1 min, p = 0.03) and contrast utilization (180 ± 104 vs. 158 ± 78 mL, p = 0.03) each decreased significantly.

	Trans-femoral (n= 1,438)	Trans-radial (n= 339)	Trans-radial Early (n=163)	Trans-radial Late (n=176)	p value, Transfemoral vs. Transradial	p value, Transradial early vs. late
Patient Characteristics						
BSA (m^2)	1.98 ± 0.27	1.97 ± 0.26	1.97 ± 0.27	2.01 ± 0.28	0.66	0.19
Age (years)	62.7 ±12.6	64.3 ± 13.7*	64.3 ±12.7	60.5 ± 12.3#	0.04	0.005
Male Gender	915 (63)	205 (60)	104 (64)	104 (64)	0.27	0.43
Diabetes Mellitus	486 (38)	113 (33)	63 (39)	56 (32)	0.87	0.21
Previous PCI	328 (23)	87 (26)	35 (21)	39 (22)	0.26	0.89
Previous CABG	193 (13)	53 (16)	25 (15)	13 (7)	0.29	0.02
PAD	77 (5)	23 (7)	12 (7)	11 (6)	0.16	0.83
Indications						
CHF	430 (30)	76 (22)*	48 (29)	45 (26)	0.006	0.71
Stable Angina	281 (19)	42 (12)*	12 (7)	42 (24)#	0.002	0.0001
Unstable Angina	359 (25)	100 (29)	59 (36)	42 (24)#	0.08	0.017
NSTEMI	239 (17)	60 (18)	28 (17)	18 (11)	0.63	0.06
STEMI	142 (10)	30 (9)	17 (10)	10 (6)	0.56	0.1
Procedural Indices						
PCI	513 (36)	93 (27)*	40 (25)	53 (30)	0.004	0.25
Fluoro Time (min)	18.8 ± 16.8	18.5 ± 18.7	18.8 ± 18.9	14.9 ± 14.1#	0.38	0.03
Proc Time (min)	69 ± 40	72 ± 43	63 ± 47	63 ± 29#	0.34	0.02
Contrast (ml)	186 ± 102	167 ± 109	180 ± 104	158 ± 78#	0.17	0.03
Complications						
Periprocedural MI	8	2	1	1	0.94	0.96
Periprocedural CVA	4	2	1	1	0.34	0.96
Significant bleeding	13	5	2	3	0.41	0.14

Table 1. Patient characteristics and procedural variables. Values reported as mean ± standard deviation or n (%);*, $p<0.05$ vs. transfemoral; #, $p<0.05$ early vs. late.

Conclusion: TRCC is safe and comparable to TFCC when performed by operators in training, and training programs should be encouraged to adopt TRCC as part of their curriculum. Procedural time, fluoroscopy time, and contrast utilization of TRCC each decrease significantly within six months of training.

Carotid and Neurovascular Intervention

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TCT-543

Safety of Carotid Stenting (CAS) Is Based on the Center Experience More Than On the Individual Performance

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Background: Relevance of training has been recognized as a key factor for safety of Carotid stenting (CAS). The objective of this study was to evaluate whether the center learning curve could shortcut the training of new trainees with CAS.
Methods: Consecutive CAS procedures performed from 2001 to 2010 were reviewed. The learning curve phase (years 2001-2003) was performed by the "leader team" ("historical team") including vascular surgeons and interventional radiologists who first approached CAS. Learning curve included acquisition of handle skill with CAS procedural steps and best selection of patients and materials. Periprocedural complications after the learning curve in the "leader team phase" (the historical team continued to perform all procedures in 2004-2006) and in the "expanded team phase" (5 new trainees joined the historical team in 2006-2010) were measured.
Results: A total of 1540 CAS were reviewed. The first 195 represented the learning curve. Of the remaining 1345 CAS, 431 were performed in the "leader phase" and 914 in the "expanded team phase". Individual operator volume for the new trainees ranged from 20 to 188 CAS. Periprocedural complications were similarly low in the two phases: strokes (2.8% vs 2.2%; p=0.56) major strokes (0.9% vs 0.8%, p=0.75), death (0.2% vs 0%; p=0.3) for the leader and expanded team phase respectively. Mean procedure time was longer (43 min vs 38 min) in the expanded team phase, while rates of immediate conversions (1.0% vs 3.5%, p=0.03) and mean contrast use (69mL vs 92mL;$p<0.0001$) decreased.
Conclusion: The primary factor driving stroke reduction with CAS is the center experience. CAS complication rate is not based on individual rules but most likely on the center/team practice also defining how to select patients and materials best suited for the procedure. Appropriate learning curve of the center can markedly shortcut the training of new trainees preserving CAS safety and efficacy.